

Acronyms and Abbreviations

1D 2D 3D AAWP AC AIDS ALC ASC ALE3D AMG
aAMG AMGe AMPI AMPL AMR ANL AP API
ARPACK ASC AST AS2TS BELCh BGK BGL BLAS
BLAST BMP BOOST BSP CADSE CAR CASC
dbCAT CCA CCD CES CFD CFL CHAOS CHOMBO
CIAC CJ COC_s CORBA CR CRON C-SAFE CSGF CSS
CSV CU CVDB DAKOTA DAG DARPA DC DCOM
DDT DG DHS DMS DMT_s DoD DNA DNS DNS
DOE DPCL DPIV DPOMP DSCEAS EC EE EETD EEBI
EFGM EOC EPIC ERD ERI ESS EGG FAS FASTA FBA
FEM FETI-DP FFLO FFT FIAT FORTRAN FOSPACK
FOSLS FY GAMS GCC GEM GHHE GLR GMRES
GNU GridDB GUI HCI HIV HkDef HLL HP HPC
HTML HTTP HVAC HYDRA HYPRE IBM ICAT ICCD
ICCS ICEO ICMT ICST IDS ISO IDX ILP IMAGE
IMPACT IOR IP IPAM I/O ISCR ISMG IT ITER ITS
JDO JPEG JSP KINSOL KOJAK KULL LANL LDA
LDRD LES LGA LINPACK LLNL LOBPCG LOCKSS
LOD LPI LPS MATLAB MCR MDCASK MEMS METIS
MHD MIRANDA MLIC MOMA MPI MRF fMRI NAI
NAIC NAMD NASA NCAR NFS NIF NIFE NNSA NR
ODE OODT OpenMP ORNL OS OSVDB PAPI PAT
PaToH PC PCG PCMDI PCR vPCR PDB PDE_s PDS
PERC PerfTrack PF3D PHP PHP/MySQL PI PIMS PIW
PLASMA PMaC PMPI POMP POP POSIX PROLINKS
PUM PVODE QBF QC QCD RANS RANSAC RBF REB

Acronyms and Abbreviations

A

1D – one-dimensional
2D – two-dimensional
3D – three-dimensional
AAWP – Analytical Active Worm Propagation
AC – alternating current
AIDS – acquired immune deficiency syndrome
ALC – ASC (see) Linux Cluster, provides computing cycles for ASC Alliance users and unclassified ASC code development. ALC and MCR (see) are sibling Linux clusters with ~1000 Intel P4 nodes with dual 2.4GHz processors.
ALE3D – Arbitrary Lagrangian-Eulerian 3D code
AMG – Algebraic Multigrid method developed to solve matrix equations resulting from the discretization of an elliptical PDE on an unstructured mesh
aAMG – adaptive AMG
AMGe – Algebraic Multigrid based on element interpolation
AMPI – Adaptive Message Passing Interface
AMPL – A Mathematical Programming Language
AMR – adaptive mesh refinement
ANL – Argonne National Laboratory
AP – asymptotic preservation
API – Application Program Interface
ARPACK – a collection of Fortran77 subroutines designed to solve large-scale eigenvalue problems
ASC – Advanced Simulation and Computing
AST – abstract syntax tree
AS2TS – Amino-acid sequence into tertiary structure

B

BELCh – Boundary Exponential Log Characteristic
BGK – Bhatnagar-Gross-Krook
BGL – BlueGene/L, an IBM computer, currently the world's fastest
BLAS – Basic Linear Algebra Subprograms
BLAST – Basic Local Alignment Search Tool
BMP – file extension for bitmap graphic files
BOOST – C++ libraries aimed at providing quality software components to developers using Standard Template Library styles.
BSP – bulk synchronous parallelism

C

CADSE – Center for Applications Development & Software Engineering
CAR – Computing and Applied Research
CASC – Center for Applied Scientific Computing
dbCAT – Catalog of Databases
CCA – Common Component Architecture
CCD – College Cyber Defenders
CES – Cost Effective Sampling
CFD – Computational Fluid Dynamics
CFL – Courant-Friedrichs-Lewy
CHAOS – Clustered High-Availability Operating System
CHOMBO – a set of software tools for implementing finite difference methods for the solution of PDEs (see) on block-structured adaptively refined rectangular grids
CIAC – Computer Incident Advisory Capability
CJ – Chapman-Jouguet
COCs – chain of custodies
CORBA – Common Object Request Broker Architecture
CR – compatible relaxation
CRON – not an acronym
C-SAFE – Center for Simulation of Accidental Fires and Explosions
CSGF – Computational Science Graduate Fellowship
CSS – Cascading Style Sheets
CSV – Comma-Separated Values
CU – University of Colorado
CVDB – consolidated vulnerability database

D

DAKOTA – Design Analysis Kit for Optimization and Terascale Applications
DAG – Directed Acyclic Graph
DARPA – Defense Advanced Research Projects Agency
DC – direct current
DCOM – DNT and PAT Computing Applications Division
DDT – deflagration to detonation transition
DG – Discontinuous Galerkin
DHS – Department of Homeland Security

DMS – Design Maintenance Systems
DMTs – data management tools
DoD – Department of Defense
DNA – deoxyribonucleic acid
DNS – direct numerical simulation
DNS – domain name system
DOE – Department of Energy
DPCL – Dynamic Probe Class Library
DPIV – Digital Particle Image Velocimetry
DPOMP – Dynamic Performance Monitor for OpenMP
DSC – Destination Source Correlation

E

EAs – evolutionary algorithms
EC – exponential characteristic
EE – Electronics Engineering
EETD – EE Technologies Division
EEBI – Energy & Environment, Biology & Biotechnology, and Institutional Computing
EFGM – element-free Galerkin methods
EOC – Emergency Operations Center
EPIC – Explicitly Parallel Instruction Computing
ERD – Environmental Restoration Division
ERI – Exploratory Research in the Institutes
ESS – European Simulation Symposium
EGG – elliptic grid generation

F

FAS – Full-approximation Scheme
FASTA – Search database that compares a protein sequence to another protein sequence or protein database, or a DNA sequence to another DNA sequence or DNA library.
FBA – flux balance analysis
FEM – finite element method
FETI-DP – Finite Element Tearing and Interconnecting Dual Primal
FFLO – Fulde, Farrell, Larkin and Ovchinnikov, discoverers of ferromagnetic-superconducting state
FFT – Fast Fourier Transform
FIAT – Framework for Interprocedural Analysis and Transformation

FORTTRAN – *formula translator*, the first compiled high-level programming language.
FOSPACK – a package developed for automatic discretization and solution of FOSLS
FOSLS – First-Order System Least-Squares
FY – fiscal year

G

GAMS – General Algebraic Modeling System
GCC – GNU Compiler Collection
GEM – Geometric Efficient Matching
GHHE – generalized hyperbolic heat equations
GLR – Generalized left right parsers
GMRES – Generalized Minimal Residual (GMRES)
GNU – GNU's not UNIX
GridDB – A Database Overlay for the Scientific Grid
GUI – Graphical User Interface

H

HCI – human-computer interaction
HIV – human immunodeficiency virus
HkDef – Hacker Defender
HLL – Harten–Lax–van Leer, developers of approximate Riemann solver for the Euler equations of inviscid gas dynamics
HP – Hewlett-Packard
HPC – High-Productivity Computing
HTML – HyperText Markup Language
HTTP – Hypertext Transfer Protocol
HVAC – heating, ventilation, and air conditioning
HYDRA – Hydrological routing algorithm that simulates the flow of water
HYPRE – high-performance conditioners

I

IBM – International Business Machines
ICAT – Internet Catalog of Assailable Technologies
ICCD – Integrated Computing & Communications Department
ICCS – Integrated Computer Control System
ICEO – induced-charge electro-osmosis

Acronyms and Abbreviations

ICMT – Internships in Computational Modeling at the Terascale
ICST – Internships in Computer Science at the Terascale
IDS – intrusion detection system
ISO – International Organization for Standardization
IDX – File format used in ViSUS (see) based on a multiresolution space-filling curve index that allows for fast multiscale data access.
ILP – instruction level parallelism
IMAGE – Integrated Molecular Analysis of Genomes and their Expression
IMPACT – Integrated Map and Particle Accelerator Tracking code
IOR – intermediate object representation
IP – Internet Protocol
IPAM – Institute for Pure and Applied Mathematics
I/O – input/output
ISCR – Institute for Scientific Computing Research
ISMG – Information System Management Group
IT – information technology
ITER – International Thermonuclear Experimental Reactor
ITS – Institute for Terascale Simulation

J

JDO – Java Data Objects
JPEG – Joint Photographic Experts Group, a graphics format ideal for photographs, artwork, and paintings; not suited to line drawings, text, or simple cartoons
JSP – Java Server Pages

K

KINSOL – solves nonlinear algebraic systems, see SUNDIALS
KOJAK – POMP-compliant (see) library for profiling and tracing OpenMP (see) applications
KULL – unclassified designation for AX-Division code used to model inertial confinement fusion (ICF, see)

L

LANL – Los Alamos National Laboratory
LDA – mathematical library integer description: On entry, LDA specifies the first dimension of A as declared in the calling (sub) program. Also – local density approximation (first-principles physics approximation within the Linear Expansion in Geometric Objects (LEGO) approach

LDRD – Laboratory Directed Research and Development
LES – Large-Eddy Simulation
LGA – Local Global Alignment
LINPACK – benchmark code for testing supercomputer TF (see) capability by solving systems of linear equations
LLNL – Lawrence Livermore National Laboratory
LOBPCG – locally optimal block preconditioned conjugate gradient
LOCKSS – Lots of Copies Keep Stuff Safe
LOD – level-of-detail
LPI – laser-plasma interaction
LPS – laser proton sources

M

MATLAB – MathWorks proprietary scientific computing and graphics capable programming language, now at V7.0
MCR – Multiprogrammatic Capability Cluster, ALC (see) and MCR are sibling Linux clusters with ~1000 Intel P4 nodes with dual 2.4GHz processors
MDCASK – Molecular dynamics code for radiation damage, to be used as one of the benchmark codes for testing ASC Purple C (see)
MEMS – Micro-Electro-Mechanical Systems
METIS – linear algebra package for partitioning unstructured graphs, partitioning meshes, and computing fill-reducing orderings of sparse matrices, written in FORTRAN
MHD – magneto-hydrodynamics
MIRANDA – research hydrodynamics code ideal for simulating Rayleigh–Taylor and Richtmyer–Meshkov instability growth. Runs on Fortran 95 with MPI (see). Important for these four factors: incompressible and compressible forms; explicit time solution (Poisson solve for incompressible); Eulerian (fixed), Cartesian mesh; and high-order-accurate derivatives
MLIC – multi-layered image cache system
MOMA – minimization of metabolic adjustment
MPI – Message Passing Interface.
MRF – Markov Random Field
fMRI – functional magnetic resonance imaging
MRO – Mars Reconnaissance Orbiter

N

NAI – Nonproliferation, Arms Control, & International Security Directorate at LLNL

NAIC – NAI (see) and Computing Applications Division within CAR (see)

NAMD – object-oriented molecular dynamics code designed for simulation of large biomolecular systems

NASA – National Aeronautics and Space Administration

NCAR – National Center for Atmospheric Research located in Boulder, CO; and the software products NCAR Command Language (NCL) and NCAR Graphics that facilitate forecasting and visualization

NFS – Network File System

NIF – National Ignition Facility

NIFE – NIF (see) and Engineering Computing Applications Division within CAR (see)

NNSA – National Nuclear Security Administration

NR – non-relativistic

O

ODE – ordinary differential equation

OODT – object-oriented data technology

OpenMP – open message-passing, de facto standard for shared-memory parallel programming of scientific applications

ORNL – Oak Ridge National Laboratory

OS – operating system

OSVDB – Open Source Vulnerability Database, a project to catalog and describe global security vulnerabilities, opened a vendor dictionary as a centralized resource on August 31, 2004. OSVDB is sponsored by Digital Defense, Inc.(1999), a private global network security provider; and by Churchill & Harriman (1986), security business partner to mid-market and Fortune 500 companies, headquartered in Princeton, NJ.

P

PAPI – Performance Analysis Programmable Interface software tool: open, cross-platform interface to the performance analysis hardware found in most modern microprocessors

PAT – Physics and Advanced Technologies Directorate at LLNL

PaToH – Partitioning Tools for Hypergraph

PC – personal computer

PCG – preconditioned conjugate gradient

PCMDI – Program for Climate Model Diagnosis and Intercomparison

PCR – polymerase chain reaction assays can amplify a target segment of DNA in suspect biological organisms

vPCR – Virtual PCR (see above)

PDB – Protein Data Bank

PDEs – partial differential equations

PDS – Planetary Data System

PERC – Performance Evaluation Research Center, a SciDAC (see) integrated software infrastructure center with four strategies for maximizing memory hierarchy: discipline-specific benchmarks; performance analysis tools; performance modeling; and performance optimization tools

PerfTrack – a database-based tool for storing, navigating, and analyzing very large amounts of performance data

PF3D – LLNL 3D laser-plasma interaction code

PHP – recursive acronym for “PHP: Hypertext Preprocessor”: general-purpose scripting language well suited for Web development and easy to embed into HTML, commonly used with the Apache HTTP server and included in Red Hat Linux versions

PHP/MySQL – These functions allow the user to access MySQL database servers. More information about MySQL can be found at <http://www.mysql.com/>

PI – Principal Investigator

PIMS – the LLNL Engineering Directorate Personnel Information Management System

PIW – Promoter Identification Workflow

PLASMA – PLANetary Scale Monitoring Architecture

PMaC – Performance Modeling and Characterization

PMPI – performance-monitoring programmable interface

POMP –standard performance monitoring interface for OpenMP (see), an API (see) to be called by probes inserted into the application by a compiler, a pre-processor, or via a binary or dynamic instrumentation mechanism

POP – Parallel Ocean Program

POSIX – Portable Operating System Interface incorporates the IEEE and Open Group set of fundamental services needed for the efficient construction of application programs.

PROLINKS – database for co-evolving proteins, used in biological studies and comparisons

PUM – partition of unity methods

PVODE – parallel ODE (see) integrator, a special case of the scaled nonlinear solver, see SUNDIALS

Acronyms and Abbreviations

Q

QBF – query by form

QC – quality control

QCD – Quantum Chromodynamics

R

RANS – Reynolds-Averaged Navier–Stokes equations

RANSAC – Random Sample Consensus

RBF – radial-basis functions

REB – relativistic electron beams

ReiserFS – jouralling filesystem included in Linux 2.4, designed and developed by Hans Reiser and his team at Namesys at, creates a single shared environment, or namespace, where applications can interact more directly, efficiently and powerfully. Users can access the filesystem directly rather than building special-purpose layers that run on top of the filesystem, such as databases.

RKPM – reproducing kernel-particle methods

RM – Richtmyer-Meshkov

RMI – Remote Method Invocation.: Java RMI allows the user to invoke a method on an object that exists in another address space — on the same machine or a different one.

RNA – ribonucleic acid: Genetic code is stored in the DNA sequence, which is transcribed into RNA and translated into a polypeptide—proteins, enzymes, or peptide hormones.

ROAM – Real-time Optimally Adapting Meshes: AMR (see) tool in which two priority queues drive split and merge operations that maintain continuous triangulations built from pre-processed bintree triangles

ROSE – name, not an acronym for the Overture Suite preprocessor that recognizes user-defined objects and substitutes optimized code before compilation

RTRAM – Real-Time Radiation Area Monitoring Network

RTS – runtime system

S

SAGE IR – at the request of LANL (see), the SAGE ASC (see) benchmark code is no longer publicly accessible

SAMRAI – Structured Adaptive Mesh Refinement Application Infrastructure

SCaLeS – Science-based Case for Large-scale Simulation

SCD – service-class description

SCE – statistical condition estimation

SCI – Scientific Computing and Imaging Institute at the University of Utah utilizes component-based environments for biomedical computing, computational combustion and other applications

SciDAC – Scientific Discovery through Advanced Computing

SCons – Open Source Software Carpentry tool that is, a next-generation build tool, an improved, cross-platform substitute for the classic Make utility with integrated functionality similar to autoconf/automake and compiler caches such as ccache.

SCWRL – Side Chain placement With a Rotamer Library

SDM – scientific data management

SDSC – San Diego Supercomputer Center

SEGRF – Student-Employee Graduate Fellowship

SGS – Slow Growing Subdivision

SIAM – Society for Industrial and Applied Mathematics

SIDL – Scientific Interface Definition Language

ccSIM – cache-coherent memory simulator

SLURM – Simple Linux Utility for Resource Mnaagement: Open Source, fault-tolerant, and highly scalable cluster management and job scheduling system for large and small Linux clusters

SMPs – symmetric multiprocessors

SPASE – Space Physics Archive Search and Extract

SOAP – an emerging communication standard that encodes remote method invocations using XML payloads over network transport mechanisms such as HTTP

SPH – smoothed-particle hydrodynamics

SPMD – Single Program Multiple Data, parallel programs that use multiple processes running the same code working on different data to solve a problem

SQA – software quality assurance

STL – Standard Template Library

STREAM – Stanford Stream Data Manager

SK – SucKIT – a fully working rootkit that is loaded through /dev/kmem

SUIF – Stanford University Intermediate Format

SUNDIALS – (SUite of Nonlinear and Differential/ALgebraic equation Solvers) consists of the following four solvers.

CVODE solves initial value problems for ordinary differential equation (ODE) systems.

CVODES solves ODE systems and includes sensitivity analysis capabilities (forward and adjoint).

IDA solves initial value problems for differential-algebraic equation (DAE) systems.

KINSOL solves nonlinear algebraic systems.

SUPRI – Stanford University Petroleum Research Institute, research group interested in the design of efficient and accurate simulation tools for compositional problems, such as those occurring in gas injection processes

SVM – Support Vector Machine

SWA – segmentation by weighted aggregation

T

TAMM – Terrestrial and Atmospheric Monitoring and Modeling

TAU – Tuning and Analysis Utilities, a program and performance analysis tool framework for high-performance parallel and distributed computing

TCP – transmission control protocol

Teraflop/s or TF – trillion floating-point operations per second

TIFF – Tagged Image File Format, a file format used for scanning, storage, and interchange of gray-scale graphic images

TPS – thin-plate spline

TRANSFAC – Transcription Factor, BIOBASE proprietary database on eukaryotic transcription factors, their genomic binding sites and DNA-binding profiles.

TSTT – Terascale Simulation Tools and Technologies

U

UC – University of California

UCI – University of California, Irvine

UCRP – University Collaborative Research Program

UI – user interface

UIUC – University of Illinois, Urbana-Champaign

URL – Uniform Resource Locator

URP – University Relations Program

UWB – ultra-wideband

V

VBL – Virtual Beam Line

VETFEM – Variable-Element-Topology Finite Element Method, a general-purpose finite in which each element is free to take essentially any polygonal (polyhedral in 3D) shape
VisIT – contraction of Visualize It, a free DOE/ASC (see both) interactive parallel visualization and graphical analysis tool for viewing scientific data on Unix and PC platforms

ViSUS – Visualization Streams for Ultimate Scalability

VTDB – Vulnerability Tracking Database

VTK – Visualization Toolkit

W

WHIRL – Word-based Information Representation Language, a representation system that combines some of the properties of relational databases, and some of the properties of statistical ranked-retrieval systems.

WPI – Worcester Polytechnic Institute

X

XML – eXtensible Markup Language

XWRAP – an XML-enabled software system for semi-automatic generation of wrapper programs for Web sources